Actual Experiences in Virtual Reality

by Alexandra Arad '02

Each day we all encounter numerous virtual realities. The person on the television screen, the voice on the other side of the phone, or the announcer on the radio is just an elusive image or sound. Our assumption that there is an actual human being behind the sights and sounds convinces us to trust these sensory experiences. In this technological age with Computer Generated Image (CGI) movies and telephone services, we unwittingly experience these virtual sights and sounds for they are now integral our computerized, digitized, modernized life. A group of social psychologists at the University of California at Santa Barbara isolated these "virtual realities" under experimental conditions to study the ensuing psychological, sociological, and physiological effects. As pioneer of Immersive Virtual Environment Technology (IVET) and co-director of the Research Center for Virtual Environments and Behavior at UCSB, Professor and Social Psychologist James Blascovich is at the forefront of this exciting field of science. He recently visited the Psychological and Brain Sciences department here at Dartmouth to explain the particulars and potential of IVE technology and how he adopted it into his own research.

The UCSB group of social psychologists has advanced virtual technology and its applications with amazing resourcefulness and innovation in the last six years. A graduate student in Blascovich's UCSB lab concocted the first IVET head apparatus out of SCUBA goggles, a pasta strainer, and two portable televisions' liquid crystal displays. Since then the head apparatuses developed into smaller, cheaper, more effective devices. Consequently, the UCSB lab has bought several IVET systems to involve multiple subjects in a study, allowing examination of social interactions and social behaviors. The computer-generated synthetic environments include full eye fields, stereoscopic "virtual sound," and real-time interactive feedback that can be easily replicated to present to multiple participants. Cameras attached to the outside of the instrument transmit real-time spatial information from the actual environment to a computer, which then feeds the information back into the virtual environment. The examiner can digitally track the subject's spatial location as well as the position of the eyes. This tool provides the experimenters an unprecedented control of experimental variables and a unique insight into the biopsychosocial reactions of the subjects.

Professor Blascovich emphasized the realness of the experience when immersed in a virtual environment; the subject genuinely perceives him/herself to be within the synthetic milieu. Therefore it is presumed that people react to these synthetic environments as if these situations were authentic. For example, when virtually presented with a plank lying across a ravine and instructed to cross, 50-60% of the adults who Professor Blascovich examined would not do it, even though they knew that there was no actual danger. Because the technology is so convincing, the behavioral and physiological effects of people in response to these virtual situations are compared to people's reactions to comparable, real-life situations.

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To accurately imitate actual human realities, scientists developed virtual people to include in the virtual experience. Similar to a character on a video game or even the photo-realistic Matrix-style cyborg, virtual people are just computerized images of the human form.

There are two possible types of representation of people in a virtual environment: the avatar and the agent. An avatar is a computer-generated image with an actual person controlling it through 3-dimensional spatial mapping in real-time. The subject wearing the IVET apparatus is always portrayed as an avatar for s/he commands the actions and reactions of the virtual image. An agent is a cyborg, a computer image with no on-line human control behind it.

An advantage of IVET to study person-to-person interactions is that the experimenter can manipulate aspects of the virtual people and their social communications in ways that are impossible to control in real experimentation. Appearances such as skin color and weight are easily changed. Fine movements such as eye movements (blinks, gazes, etc.) and facial expressions can be programmed. Even the point-of-view and line-of-sight can be digitally manipulated allowing the subject to view him/herself from a bird's eye view, an external view or from the eyes of a fellow virtual person inside the virtual environment. In such a situation, a subject can watch him/herself and respond to his/her own signals.

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Blascovich studies the inter- and intrapersonal complexities of virtual social interaction. He considers a subject's reaction to others in terms of social conformity, social comparison, social distance and social facilitation in both verbal and non-verbal communications. For example Blascovich recently conducted a study to examine the function of eye gaze on individuals' regulation of personal space in IVE. Another, more complex example is Blascovich's virtual blackjack casino. The subject played twenty hands of blackjack alone (the control) and twenty hands with avatar and agent confederates. In analyzing the behavior and measuring the bets of the subject in response to avatars versus agents, Blascovich drew conclusions about the subject's social behaviors. In particular he considered the social conformity, social comparison, risk-taking, and the cognitive levels of the subject's behaviors. Does the awareness of the human element behind an avatar affect the subject's conception of a social presence? Does the same awareness influence how the subject's bets? Interestingly, Blascovich found that subjects bet higher against agents. Perhaps, he hypothesizes, the subjects feel a confidence or superiority to the agents knowing they are not real; maybe they were intimidated by the human manipulation of avatars so they bet more conservatively.

Professor Blascovich foresees even greater applications of IVET in research and in the general public as the technology becomes more affordable and marketable. He predicts that IVET apparatuses will one day be as ubiquitous as computers, there will be one in every household. In that case, he would have access to thousands more possible subjects for future studies. He predicts that a lab's central computer system will be able to dial into people's personal IVET systems, much like internet and email access available today. This would serve to facilitate equal probability sampling to truly randomize groups of subjects for studies. IVET can even be used in fMRI, expanding and regulating experimental options within the scanner limit. The uncertainty of relying on subjects to use his/her imagination as an experimental condition will be replaced by the desired imagery being presented to the subject. This allows the expansion of biopsychosocial research to include neuroscientific research as well. In fact, Professor Blascovich is currently collaborating with Dartmouth professors in writing a proposal for a grant to install IVET in the Dartmouth MRI scanner. He also referred to the potential of personal IVET's as an instructional, educational instrument. Researchers at the UCSB Research Center for Virtual Environments and Behavior are currently experimenting with different learning systems and instructional models. These will be used to re-create virtual "classrooms" for virtual, interactive learning. ■